SPECIFICATION

Electronic Version 1.2.8

Stylesheet Version 1.0

TOWED TOW BED MODULAR VEHICLE CARRIER APPARATUS, SYSTEM, AND METHOD

Cross Reference to Related Applications

This application claims priority benefit from provisional application US 60/383,541, filed May 28, 2002.

Background of Invention

[0001] Motorists from time to time find themselves in the unhappy position of needing to have their vehicles towed, due to a breakdown or similar non-functioning of their vehicles. While some vehicles can be towed with two wheels on the road, many other vehicles (four-wheel drive vehicles, for example) cannot. These vehicles must be towed on a flatbed deck / vehicle carrier, where all wheels of the vehicle are off the road. This means that tow service operators typically must purchase and maintain two vehicles: first, a conventional tow truck with a "wheel lift" such as the widely used "T" bar; second, a flatbed truck with complex hydraulics used to tilt the rear of vehicle-carrying deck so that vehicles on the road may be readily pulled up onto the deck. Once the vehicle(s) are atop the deck, the deck is returned to a position parallel with the road, and can then be driven from one location to another with the vehicles in carriage.

[0002] It would be desirable if the operator of a towing service could avoid having to maintain two separate vehicles in the manner discussed above. Rather, it would be preferred to maintain only a single vehicle, namely, a conventional tow truck, and, by use of a suitable conversion module, to convert the tow truck into a configuration for flatbed towing when desired, and even into a combination flatbed / wheel lift device.

Summary of Invention

[0003] Disclosed herein is a method of using a wheel lift towing vehicle to carry vehicles as a vehicle-carrying towing vehicle. A modular vehicle carrier comprising a tow bed of sufficient dimension and constitution to carry at least one automotive vehicle thereupon is mated with a wheel lift device of the wheel lift towing vehicle. The tow bed is tilted into a position for vehicle loading and unloading by raising the wheel lift device, and into a position for travel by lowering the wheel lift device. Also disclosed is a related modular vehicle carrier apparatus comprising: a tow bed of sufficient dimension and constitution to carry at least one automotive vehicle thereupon; wheel lift mating means for mating said tow bed with a wheel lift device of a wheel lift towing vehicle; and tilting means for enabling the mated wheel lift device to tilt said tow bed into a position for vehicle loading and unloading by raising said wheel lift device, and for enabling said wheel lift device to tilt said tow bed into a position for travel by lowering said wheel lift device.

Brief Description of Drawings

[0004] The features of the invention believed to be novel and nonobvious are set forth in the appended claims. The invention, however, together with further objects and advantages thereof, may best be understood by reference to the following description taken in conjunction with the accompanying drawing(s) in which:

[0005] Fig. 1 is a perspective view illustrating a modular vehicle carrier in a preferred embodiment.

[0006] Fig. 2 is a side plan view illustrating the modular vehicle carrier of Fig. 1 when is it moved into a position to load and unload vehicles.

[0007] Fig. 3 is a side plan view illustrating the modular vehicle carrier of Fig. 1 when is it moved into a position to carry (travel with) vehicles, or to travel without vehicles.

[0008] Figs. 4 and 5 are respective perspective and side plan views illustrating a particular embodiment for attaching and securing the modular vehicle carrier to a towing vehicle.

[0009] Fig. 6 is a perspective view illustrating a tow bed headboard in a preferred

embodiment.

Detailed Description

[0010] A modular vehicle carrier *1* with a "Tow Bed" *11* as disclosed herein and illustrated in Fig. 1 increases the vehicle-carrying capacity by at least one vehicle, of a wheel lift towing vehicle *2* such as a conventional tow truck with a wheel lift *12* such as a "T" bar. Importantly, it also enables a conventional wheel lift towing vehicle to load, unload, and carry vehicles *21* , such as four-wheel drive vehicles, that cannot be towed in the conventional manner with any wheels touching the road *22* .

[0011] Modular vehicle carrier *1* herein disclosed is a vehicle carrier / flatbed for one or more vehicles *21* that is pulled by either a towing vehicle *2* or another vehicle carrier (such as a conventional flatbed truck, not shown, with a wheel lift *12* attached at the back end thereof) by attaching modular vehicle carrier *1* to a wheel lift *12* , e.g., "T"bar of the towing vehicle *2* or other vehicle carrier. The normal function of a wheel lift *12* on a towing vehicle *2* or other vehicle carrier is to attach and secure a vehicle that is being towed. To do this the wheel lift *12* raises and lowers the vehicle to be towed by using power supplied by towing vehicle *2* . In accordance with the invention, when modular vehicle carrier *1* with tow bed *11* is attached to wheel lift *12* as shown generally in Figs. 2 and 3, this same range of motion allows for the lifting *23* of the front end *17* of the tow bed *11* thus causing the rear end *14* of tow bed *11* to descend *24* until it substantially touches the road *22* allowing for the loading / unloading of vehicles *21* , as shown in Fig. 2. This occurs because of the design of the tow bed *11* deck, including a bend at *18* and the placement of a wheel axle *13* thereof that serves as a pivot point. After loading / unloading of vehicles, wheel lift *12* lowers the front end *17* of tow bed *11* in the same way that it lowers a towed vehicle in ordinary operation, thus raising the rear end *14* of tow bed *11* to allow for normal over the road usage. Winches and / or cranes (not shown) on the towing vehicle *2* or vehicle carrier perform the positioning of the vehicles to be carried, in a manner customary in the art. Importantly, there are no hydraulics or lifting equipment on modular vehicle carrier *1* itself, thus making it modular and inexpensive to manufacture and maintain. All of the lifting hydraulic or other means in supplied by the towing vehicle *2* or other vehicle carrier via its wheel lift *12* .

[0012] Modular vehicle carrier *1* is a simple, unitary device that *does not require any built-in hydraulics* or similar means for tilting. Modular vehicle carrier *1* comprises a substantially flat, vehicle-carrying tow bed *11* deck thereof (with the bend illustrated at *18*), a wheel axle *13* that can be secured to tires *16* as shown about which the tow bed may be tilted when the front end *17* of tow bed *11* is raised and lowered, and a mating means *15* such as the illustrated tow leg for mating with a wheel lift *12*, such as but not limited to, the ordinary "T" bar-type vehicle lift of an ordinary towing vehicle *2* (e.g., tow truck).

[0013] Modular vehicle carrier *1* including tow bed *11* takes novel and non-obvious advantage of the fact that wheel lifts *12* already are designed to be moved up and down to raise and lower a vehicle that is being towed with two wheels raised and two wheels on the road. In particular, modular vehicle carrier *1* mates with this very same wheel lift *12* of the towing vehicle *2* via the illustrated mating means *15* such as a tow leg, and takes advantage of this very same up and down wheel lift movement to raise and lower the front end *17* of the tow bed *11* so that the back end *14* of tow bed *11* contacts the road *22* and one or more vehicles *21* can then be loaded onto and unloaded off of tow bed *11*. In addition, once the vehicle(s) *21* have been loaded on tow bed *11* (or when tow bed *11* is empty and simply needs to be pulled), the towing vehicle *2* (or other carrier with a wheel lift) pulls tow bed *11* via this mated connection *31* between wheel lift *12* and mating means *15*, e.g., the tow leg, so that wheel lift *12* further serves as a tow "hitch." In this way, the ordinary wheel lift *12* of a towing vehicle *2* or other vehicle carrier replaces the complex and costly hydraulic systems that are normally used to tilt tow beds for loading and unloading. Thus, a person who owns an ordinary towing vehicle does not need to incur the expense of purchasing a wholly separate flatbed truck with complex tilting mechanisms for loading and unloading vehicles. They need only purchase the simple, low cost modular vehicle carrier *1* of Fig. 1 for attachment to their pre-existing towing vehicle *2*.

[0014] Wheel lift *12* is thereby used in a novel and non-obvious manner to serve three distinct functions: 1) it is an ordinary wheel lift when modular vehicle carrier *1* including tow bed *11* is not attached; 2) it provides the lifting and descending motion to tow bed *11* to tilt tow bed *11* for vehicle loading and unloading and thereby replaces and enables omission of the separate hydraulic or similar systems that are

normally used to cause this tilting; and 3) it serves as a trailer hitch to move (e.g., pull) tow bed *11* for travel, with or without vehicles *21* atop.

[0015] Figs. 1-3 illustrate a particular means for mating wheel lift *12* to tow bed *11* which employs mating means *15* comprising the illustrated tow leg, and Figs. 4 and 5 further show a particular means for securing this tow leg to wheel lift *12*. But, it is understood that this is but one example of a variety of conceivable ways in which the mating between wheel lift *12* and tow bed *11* can take place, and it is understood that a broad range of options for mating wheel lift *12* to tow bed *11* to enable wheel lift *12* to tilt tow bed *11* for loading and unloading, and to pull tow bed *11* otherwise, are considered to be within the scope of this disclosure and its associated claims. Tow leg *15*, as well as the means to secure tow leg *15* to wheel lift *12* can be varied within the scope of this disclosure and its associated claims, so long as the wheel lift *12* is capable of raising (Fig. 2) and lowering (Fig. 3) the front end *17* of tow bed *11*, and of pulling tow bed *11* when it is in the lowered (Fig. 3) position. When vehicle carrier *1* is unattached to a towing vehicle, its front end *17* is supported with respect to the ground by tow leg *15*.

[0016] Thus, the disclosed method of loading, unloading and towing at least one vehicle *21* on a tow bed *11*, comprises the steps of: mating (via mating means *15*) the tow bed *11* to a wheel lift device *12* of a towing vehicle or an other carrier *2* (as illustrated, or by any of a variety of means for achieving a similar mating function); tilting *23* the mated tow bed into a position to load and unload the at least one vehicle by raising the wheel lift device *12* (as in Fig. 2 generally); and tilting the mated tow bed into a position to tow the at least one vehicle *21* by lowering the wheel lift device *12*. Additionally, the mated tow bed (with or without vehicles atop) is pulled by the towing vehicle *2* or other carrier via its mating with the wheel lift device *12*.

[0017] The disclosed modular vehicle carrier *1* comprises wheel lift mating means (again, as illustrated, or by any of a variety of means for achieving a similar mating function) for mating the tow bed *11* to a wheel lift device *12* of a towing vehicle or other carrier *2*, wherein: the tow bed *11*, when mated (via *15*) with the wheel lift device *12*, is tilted *23* into a position to load and unload at least one vehicle *21* by raising the wheel lift device *12*; and the tow bed *11*, when mated (via *15*) with the wheel lift device

12 , is tilted into a position to tow the at least one vehicle *21* by lowering the wheel lift device *12* . Additionally, the mated tow bed (with or without vehicles *21* atop) is pulled by the towing vehicle *2* or other carrier via its mating with the wheel lift device *12* . Also shown in Fig. 1 is a securing means *5* , to be discussed below with reference to Fig. 5.

[0018] A key element of this invention is thus the mating of the tow bed *11* to a wheel lift "T"bar *12* , and as stated above, many options may be chosen within the scope of this disclosure and its associated claims to implement this mating. One such option uses tow legs *15* , as illustrated and discussed herein, in detail.

[0019] In the particular mating implementation illustrated, which is to be regarded as an example and not to be interpreted as limiting, there are two tow legs under tow bed *11* . All dimensions are approximate and illustrative and allow for significant variation within the scope of the disclosure and the associated claims. As illustrated in Fig. 4, mating means *15* comprise a tow leg which is approximately 18" high (*41*), 3" wide (*42*) (along the vehicle carrier *1* width) and 6" long (*43*) (along the vehicle carrier *1* length) using approximately 1/4 inch thick rectangular steel tubing or any equivalent. The tops of tow legs *15* are welded to the underside of a 3X6X1/4 inch rectangular tube frame rail, not shown, that is positioned on end for strength and runs the length of tow bed *11* . Each tow leg *15* is positioned, on center, approximately 36"in from front end *17* of tow bed *11* and approximately 40"in from its respective side. A concave bottom section (tow leg saddle *44*) of tow leg *15* is made, for example, not limitation, from a 6"diameter standard pipe that is welded to it. A 6" diameter pipe, uncut, has a circumference of approximately 19", and thus such a pipe cut in half would have an approximately 9.5" circumference. This 6"pipe is cut so that it has an approximately 11" circumference, which means that a little more than half the pipe is utilized and that the lower ends of concave bottom section *44* thus curve back inward slightly. The pipe is approximately 6"running parallel to the vehicle carrier *1* width along *45* and is attached in such a manner that the end is concave and looks like a saddle. The 6"long bottom pipe end of the tow leg *15* is centered on and protrudes 1 ½ "on either side of the 3" wide rectangular tube portion of tow leg *15* . This allows tow leg *15* to rest on top of the wheel lift *12* "T"bar like a "saddle," *44* .

[0020] Link chain securing means *54* for securing link chain *53* to be discussed shortly are welded on the centerline of a tow leg and 3"up from the bottom on the side facing the front end of a tow bed, and also on the centerline on the rear side of the tow leg and 3"up from the bottom of a tow leg.

[0021] As now illustrated in Fig. 5, in reference to Fig. 4 which provides a perspective view, tow leg *15* is attached to the wheel lift *12* "T"bar using securing means *5* for securing mating means *15* such as the tow leg to wheel lift *12* . Securing means *5* comprises a securing center pin *51* which is inserted into a hollow square end *46* of the wheel lift *12* "T"bar while the tow leg saddle *44* is resting on it. Securing center pin *51* comprises an approximately 2"diameter standard pipe, peg, or suitable equivalent, and is approximately 6"long. A lateral securing means such as the illustrated circular approximately ¼ "thick steel securing plate *52* with an approximately 6" diameter is welded, substantially on center, to the outside end of a center pin pipe *51* . Welded to the outside center securing plate *52* is an approximately 36"length of 5/16"link chain *53* or suitable equivalent securing apparatus. Link chain *53* is hooked onto a 5/16"grab hook or equivalent link chain securing means *54* on a first position on tow leg *15* (in the illustration, on the front side of the tow leg *15*) for securing link chain *53* , such that securing plate *52* is firmly seated against the hollow square end *46* of the wheel lift *12* "T"bar. This is done for both ends *46* (first end and second end) of the "T" bar. The rest of link chain *53* is then dropped under and around the wheel lift *12* "T"bar and the bottom of the tow leg saddle *44* and attached to the second link chain securing means *54* on a second position (in the illustration, the rear side) of tow leg *15* such that wheel lift *12* "T"bar and tow leg *15* are firmly secured together. This serves to secure tow leg *15* to wheel lift *12* "T" bar such that 1) the "T" bar will not sway from side to side (laterally) relative to tow leg *15* because of securing plates *52* , and "T" bar will be vertically secured relative to tow leg *15* because of the section of link chain *53* residing under the "T" bar.

[0022] Other dimensions of interest which are provided for illustration, not limitation, are the following: Tow bed *11* is optimally about 28" in length and about 90"-96"wide. Modular vehicle carrier *1* comprises an approximately 10,000 lbs dual wheel axle *13* and approximately 16"rims. dual wheel axle *13* is located approximately 16" from front end *17* and approximately 12" from the rear end *14* of tow bed *11* . Tow bed *11*

deck comprises 3/16"plate steel, or, if desired, aluminum, or any other suitable equivalent material.

[0023] Tow bed *11* deck is welded to 3"X3/16"standard channel cross braces, not shown, under it which are located every 12" on center. The cross braces are welded transversely to the top of two longitudinal 3X6X1/4 inch rectangular tube frame rails, not shown, that are oriented so the top and bottom surface is 3"wide and the sides, which are perpendicular to the road, are 6".

[0024] Tow bed *11* deck, in the over the road trailer position, is horizontal, i.e., parallel to the road *22*, for the first 16" from its front end *17* back to a location proximate wheel axle *13*. It is approximately 36"high off of the road *22*. From that point proximate wheel axle *13* and for 12" to the rear end of a tow bed, at tow bed bend *18*, tow bed deck *11* declines in a straight line to a height of 18"off the road. Thus, it drops for a 1.5 foot rise over a 12 foot run for an approximately 1/8 grade A 3X6X1/4"frame rail, not shown, is bent or mitered in a downward angle at the wheel axle to accommodate the rear deck decline and is tapered at the rear end.

[0025] As illustrated in Fig. 6, tow bed *11* deck may comprise a headboard *6*, mounted transversely on the front end of the deck. Headboard *6* allows a vehicle to be braced and secured to it and prevents it from rolling off the front of a tow bed.

[0026] Headboard *6* is the width of a tow bed deck. In a 90"wide deck there is a 3"standard pipe 90"long or equivalent base attachment *61* welded to the front edge of the deck plate with the top of the pipe being on substantially the same plane as the deck. Welded to a deck plate at the leading edge of a tow bed and abutting the 3"pipe are two solid ¼ "sheet steel 8" right triangles or substantial equivalents *62*. A right triangle is welded on both outside edges of a deck. A 1 ¼ "standard pipe 89 ½ "long or equivalent upper transverse member *63* is butt-welded to the inside top part of the two 8"right triangles which serve as end caps.

[0027] A center upper and lower loading/unloading cable guide is formed by welding two 7 ½ "long 1 ¼ "standard pipes or equivalent upright members *64* in a vertical position each one 36"in from the outside edge of a deck and into notches provided in the 3"standard pipe on the bottom and the 1 ¼ "standard pipe on the top. A 1 ¼ "standard

pipe 17"long, with contoured ends to fit the vertical pipes, or equivalent crossing member *65* is welded to them 3 ¾ "on center between and parallel to the top and bottom pipes.

[0028] There are eight tie down anchor chain slots, not shown, on the deck of a tow bed. Two slots are located 12"in from the front end of a tow bed and 6"in from each outside edge. Two slots are located 12"in from the rear of a tow bed and 6"in from each outside edge. There are four slots located near the midway point between the front and rear ends of a tow bed. Two of the slots are 6"forward of the mid point and 6"in from the outside edge of a tow bed and two slots are 6" to the rear of the mid point and are 6"in from the outside edge of a tow bed.

[0029] There is a standard brake, directional and night-light package available, not shown.

[0030] There are stake pockets, not shown, provided on the outside edges of the tow bed deck for optional side rails, not shown.

[0031] A standard fold down leg stand or landing gear, not shown, can be provided that is mounted behind the tow leg.

[0032] The tow bed itself may comprise its own, optional wheel lift, not shown, so that a vehicle can be towed with two wheels elevated and two wheels on the road, behind the tow bed, or so that an additional such tow bed can be added in a "train" configuration consistently with vehicle safety requirements and so long as the towing vehicle has sufficient power.

[0033] The bend *18* in tow bed *11* is positioned and angled, and located proximate wheel axle *13* , such that a region of tow bed *18* forward of bend *18* is substantially parallel to the road *22* when the tow bed *11* is in the position for travel (Fig. 3), and a rear end *14* of tow bed *11* aft of bend *18* substantially contacts road *22* when tow bed *11* is in the position for loading and unloading (Fig. 2), when said module vehicle carrier is attached to tires *16* thereof via wheel axle *13* . The various dimensions and bend angles of this arrangement can be varied, so long as this fundamental functionality (raise to load and unload, lower to travel) is achieved.

[0034] The vertical "rise" of a typical wheel lift, combined with the height of tires that are of a suitable diameter for use on the tow bed, further combined with the need to tilt the tow bed so that its back end touches the road for loading and unloading when its front end is raised, and further combined with the need to place the tires in a fore-aft position that optimizes the balance of the tow bed when loaded and unloaded, all serve to determine an optimal length for the tow bed as specified above, as well and the optimal location for wheel axis *13* and the tow bed bend *18*. This optimal length turns out to be suitable for carrying two vehicles on the tow bed, and if the tow bed has its own optional wheel lift at the back, this can be used to tow a third vehicle in the traditional manner with one wheel pair down and one wheel pair elevated, or to add an other tow bed in a train as noted above.

[0035] The use of a wheel lift "T" bar serves to stabilize the tow bed, because such a T bar is typically at least as wide as the separation between two vehicle tires on a single axle, and thus provides stability against "twisting" that could occur, for example, with a mere "ball" hitch.

[0036] It is to be understood that the use of the term "towing vehicle" and variations thereof is to be understood differently than the use of the term "vehicle" by itself or in a context other than that of the towing vehicle. In particular, the latter usage is to be understood to refer to vehicles that are to be towed by the towing vehicle.

[0037] While it is preferable that wheel lift *12* be used not only to raise and lower modular vehicle carrier *1* for loading / unloading and travel, but also to pull modular vehicle carrier *1* during travel, it is not essential that this occur. It is to be considered within the scope of this disclosure and its associated claims that someone might make use of a different form of connection between towing vehicle *2* and modular vehicle carrier *1* for the purpose of pulling modular vehicle carrier *1* along the road versus raising and lowering modular vehicle carrier *1* , even though this gives up the advantage of using wheel lift *12* as a hitch for travel as well as as a lift for loading / unloading.

[0038] While towing vehicle *2* will often be a conventional tow truck with a wheel lift *12* , it is understood that towing vehicle *2* may comprise any vehicle comprising a wheel lift device *12* , including, for example, an ordinary flatbed carrier with a wheel lift *12*

on its back. In this latter situation, attaching the wheel lift *12* at the back of the flatbed carrier to modular vehicle carrier *1* establishes a "train," and thereby adds to the vehicle-carrying capacity of the flatbed carrier.

[0039] While only certain preferred features of the invention have been illustrated and described, many modifications and changes will occur to those skilled in the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the invention.